

What is claimed is:

1. Circulating fluidized bed reactor comprising:
 - a reactor chamber;
 - at least one duct connected with the reactor chamber for drawing off a flue gas having entrained solid particles from the reactor chamber;
 - at least one cyclone separator that is connected with the duct for separating solid particles from the flue gas;
 - at least one recirculation device for recirculating at least a portion of the separated solid particles from the cyclone separator into the reactor chamber, the at least one recirculation device comprising
 - a siphon-trap gas seal including a riser having a circumference, an upper end, and first and second outlet openings on the circumference of the riser proximate to the upper end, the first and second outlet openings pointing substantially in the direction of the reactor chamber,
 - a device for fluidizing the portion of the separated solid particles, and
 - a device for connecting each opening of the gas seal riser with the reactor chamber.
2. Circulating fluidized bed reactor according to claim 1 wherein the first and second outlet openings are each disposed at a height on the gas seal riser, each of the openings being disposed at substantially the same height, the first and second outlet openings defining an angle of 60 to 180° to each other.

3. Circulating fluidized bed reactor according to claim 1 wherein the first and second outlet openings are each disposed at a height on the gas seal riser, each of the openings being disposed at substantially the same height, the first and second outlet openings defining an angle of 90° to each other.

4. Circulating fluidized bed reactor according to claim 1 wherein the recirculation device has a longitudinal axis and the first and second outlet openings are symmetrical to the recirculation device longitudinal axis.

5. Circulating fluidized bed reactor according to claim 1 wherein the recirculation device has a longitudinal axis and each device for connecting the outlet opening of the gas seal riser with the reactor chamber comprises:

- a connecting piece inclined downward from a first end to a second end, the first end being in communication with a one of the outlet openings, the connecting piece extending at an angle of 30 to 90° to the recirculation device longitudinal axis;

- a first connecting part extending vertically downward from a first end to a second end, the first end of the first connecting part being connected to the second end of the connecting piece; and

- a second connecting part inclined downward from a first end to a second end, the first end of the second connecting part being connected to the second end of the first connecting part and the second end of the second connecting part being in communication with the reactor chamber.

6. Circulating fluidized bed reactor according to claim 5 wherein the connecting piece of the device for connecting the first outlet opening of the gas seal riser to the reactor chamber and the connecting piece of the device for connecting the second outlet opening of the gas seal riser to the reactor chamber are disposed symmetrically to each other.

7. Circulating fluidized bed reactor according to claim 5 wherein the reactor chamber has a longitudinal axis and the second connecting part of the device for connecting the first outlet opening of the gas seal riser to the reactor chamber and the second connecting part of the device for connecting the second outlet opening of the gas seal riser to the reactor chamber are disposed substantially parallel to the reactor chamber longitudinal axis or the recirculation device longitudinal axis.

8. Circulating fluidized bed reactor according to claim 1 wherein the reactor chamber has an inlet opening in communication with each device for connecting the outlet openings of the gas seal riser to the reactor chamber, the reactor chamber inlet opening being disposed in a lower region of the reactor chamber.